Serial No.: 10/568,803
Atty. Docket No.: P69083US1

IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) An optical component comprising a combination of optical waveguide elements for modifying the spot size of a mode of an electromagnetic field propagated by an optical waveguide element, the optical waveguide elements being formed on a substrate, the optical component comprising a) a first section, comprising a first optical waveguide element ~~adapted~~ <u>configured</u> to sustain at least one mode of the electromagnetic field, b) a second section comprising at least two cooperating optical waveguide elements, each of said at least two cooperating optical waveguide elements comprising at least one waveguide segment, said at least two cooperating optical waveguide elements being optically connected to said first optical waveguide element of said first section; wherein said cooperating optical waveguide elements of said second section are adapted to maintain optical coupling between said optical waveguide elements to ensure that said at least one mode of the electromagnetic field is sustained by said at least two cooperating optical waveguide elements in cooperation<u>, and said first optical waveguide element and said at least two cooperating optical waveguide elements are tapered to increase in</u>

width towards their common interconnection wherein the tapering of at least one of the edges of the first optical waveguide element and/or at least one of the edges of the at least two cooperating optical waveguide elements are defined by a generating curve essentially following a trigonometric functional path, or an n^{th} order polynomial path of at least 5^{th} order.

2. (Cancelled).

3. (Cancelled).

4. (Currently Amended) An optical component as claimed in claim ~~2~~ 1 wherein the tapering of said first optical waveguide element of said first section is defined by a generating curve essentially following a cosine path or an n^{th} order polynomial path~~, such as a linear path or a 5^{th} or a 7^{th} order polynomial path~~.

5. (Previously Presented) An optical component as claimed in claim 1 wherein adjacent of said at least two cooperating optical waveguide elements of said second section have mutual edge to edge core distances $s_{2,i,i+1}$, and wherein said edge to edge core distances

$s_{2,i,i+1}$ decrease towards their connection to said first optical waveguide element of said first section.

6. (Cancelled).

7. (Cancelled).

8. (Currently Amended) An optical component as claimed in claim ~~6~~ 1 wherein the tapering of at least one of said cooperating optical waveguide elements of said second section is defined by a generating curve essentially following a cosine path or an n^{th} order polynomial path~~, such as a linear path or a 5th or a 7th order polynomial path~~.

9. (Previously Presented) An optical component as claimed in claim 1 wherein the width w_1 of said first optical waveguide element of said first section is larger than or equal to the sum of widths $w_{2,i}$ of said cooperating optical waveguide elements of said second section at their mutual connection.

10. (Currently Amended) An optical component as claimed in claim 1 wherein said at least two cooperating optical waveguide

elements of said second section are ~~adapted~~ configured to be optically coupled to an output optical waveguide.

11. (Original) An optical component as claimed in claim 10 wherein said output optical waveguide is formed on said substrate.

12. (Previously Presented) An optical component as claimed in claim 1, the optical component further comprising c) a third section comprising at least two dicing optical waveguide elements having core widths $w_{3,i}$, said at least two dicing optical waveguide elements being optically connected to said at least two cooperating optical waveguide elements of said second section.

13. (Previously Presented) An optical component as claimed in claim 12 wherein said at least two dicing optical waveguide elements are essentially straight and parallel.

14. (Original) An optical component as claimed in claim 13 wherein the widths $w_{3,i}$ of said at least two dicing optical waveguide elements of said third section remain essentially constant.

15. (Previously Presented) An optical component as claimed in claim 12 wherein the widths $w_{2,i}$ of said at least two cooperating waveguides of said second section essentially equals the widths $w_{3,i}$, where i=1, 2, ..., of said at least two dicing optical waveguide elements of said third section at their mutual connection.

16. (Currently Amended) An optical component as claimed in claim 12 wherein said at least two dicing optical waveguide elements of said third section are ~~adapted~~ configured to be optically coupled to an output optical waveguide.

17. (Currently Amended) An optical component as claimed in claim 16 wherein said output optical waveguide is an optical fibre~~, such as a single mode fibre, e.g. an SMF-28 type optical fibre~~.

18. (Currently Amended) An optical component as claimed in claim 1 wherein said first optical waveguide element of said first section is ~~adapted~~ configured to be optically coupled to an input optical waveguide, said input optical waveguide having a width w_{in} which is essentially equal to the width w_1 of said first optical waveguide element at their mutual connection.

19. (Original) An optical component as claimed in claim 18 wherein said input optical waveguide is formed on said substrate.

20. (Previously Presented) An optical component as claimed in claim 1 wherein said combination of optical waveguide elements comprises a base layer formed on said substrate, the base layer having a refractive index n_{base}, a waveguide defining core pattern of a core material formed on the base layer, the core material having a refractive index n_{core}, an upper cladding layer covering the core pattern and the base layer, the upper cladding layer having a refractive index n_{uclad}.

21. (Currently Amended) An optical component as claimed in claim 20 wherein the index contrast between core and cladding and/or core and base layers $(n_{core}-n_{uclad})/n_{core}$, $(n_{core}-n_{base})/n_{core}$, respectively, is larger than 0.5%~~, such as larger than 1%, such as larger than 2%~~.

22. (Previously Presented) An optical component as claimed in claim 1 wherein at least one transversal waveguide core element is arranged between said at least two cooperating optical waveguide elements of said second section.

23. (Original) An optical component as claimed in claim 22 wherein a multitude of M transversal waveguide core elements each having a width $w_{t,j}$, where j=1, 2, ..., M, and forming paths with a mutual centre to centre distance of $s_{t,j,j+1}$, where j=1, 2, ..., M-1, j=1 corresponding to the transversal element located closest to said first section and j=M corresponding to the transversal element located farthest from said first section.

24. (Original) An optical component as claimed in claim 23 wherein said widths $w_{t,j}$ decrease with increasing j and/or said centre to centre distances of $s_{t,j,j+1}$ increase with increasing j.

25. (Previously Presented) An optical component as claimed in claim 1 wherein said core material comprises a material from the group GaAs, InP, SiON, Silicon, polymers, sol-gel glasses, $LiNbO_3$.

26. (Currently Amended) A method of manufacturing an optical component ~~according to claim 1 comprising~~ having a combination of optical waveguide elements for modifying the spot size of a mode of an electromagnetic field propagated by an optical waveguide element, the optical waveguide elements being formed on a substrate, the optical component comprising a first section,

comprising a first optical waveguide element configured to sustain at least one mode of the electromagnetic field, and a second section comprising at least two cooperating optical waveguide elements, each of said at least two cooperating optical waveguide elements comprising at least one waveguide segment, said at least two cooperating optical waveguide elements being optically connected to said first optical waveguide element of said first section; wherein said cooperating optical waveguide elements of said second section are adapted to maintain optical coupling between said optical waveguide elements to ensure that said at least one mode of the electromagnetic field is sustained by said at least two cooperating optical waveguide elements in cooperation, and said first optical waveguide element and said at least two cooperating optical waveguide elements are tapered to increase in width towards their common interconnection wherein the tapering of at least one of the edges of the first optical waveguide element and/or at least one of the edges of the at least two cooperating optical waveguide elements are defined by a generating curve essentially following a trigonometric functional path, or an n^{th} order polynomial path of at least 5^{th} order, the method comprising the steps of: a) providing a substrate, b) forming a lower cladding layer on the substrate, c) forming a core layer on the lower

cladding layer, d) providing a core mask comprising a core region pattern corresponding to the layout of the core regions of optical waveguide elements of the component, e) forming core regions using the core mask, a photolithographic and an etching process, and f) forming an upper cladding layer to cover the core region pattern and the lower cladding layer[[,]].

27. (Original) A method according to claim 26, the method further comprising the steps of g) cutting the dicing waveguides of the third section of the components h) dicing/polishing the end facets of said dicing waveguides.

28. (Currently Amended) A method according to claim 26, the method in step d) further comprising the sub-step of d1) providing that the tapering of the core region of said first waveguide element of said first section and/or at least one of said cooperating optical waveguide elements of said second section of said optical component is/are defined by a generating curve essentially following a cosine path or an n^{th} order polynomial path~~,~~ ~~such as a linear path or a 5^{th} or a 7^{th} order polynomial path~~.

29. (Previously Presented) A method according to claim 26 wherein the substrate is a silicon substrate, the base and cladding layers comprise silica based oxides and the core layer comprises silicon-oxy-nitride.

30. (Previously Presented) A method as claimed in claim 26 wherein the formation of layers on the substrate is made by plasma enhanced chemical vapour deposition.

31. (New) An optical component as claimed in claim 20 wherein the optical waveguide elements comprises a base layer formed on the substrate, a waveguide-defining core pattern of a core material formed on the base layer and an upper cladding layer covering the core pattern and the base layer.

32. (New) An optical component as claimed in claim 1 wherein the waveguide elements of the first and second sections each comprises a core region and the core regions of the optical waveguide elements of the second section are implemented in the same physical layer and continue into the core region of the first optical waveguide element of the first section of the optical component.

33. (New) An optical component comprising a combination of optical waveguide elements for modifying the spot size of a mode of an electromagnetic field propagated by an optical waveguide element, the optical waveguide elements being formed on a substrate, the optical component comprising a) a first section, comprising a first optical waveguide element b) a second section comprising at least two cooperating optical waveguide elements, said at least two cooperating optical waveguide elements being optically connected to said first optical waveguide element of said first section; and said first optical waveguide element and said at least two cooperating optical waveguide elements being tapered to increase in width towards the optical connection between the cooperating optical waveguide elements and the first waveguide element wherein the tapering of at least one of the edges of the first optical waveguide element and/or at least one of the edges of the at least two cooperating optical waveguide elements are defined by a generating curve essentially following a trigonometric functional path, or an n^{th} order polynomial path of at least 5^{th} order.

34. (New) An optical component as claimed in claim 4 wherein said generating curve follows a 5^{th} or a 7^{th} order polynomial path.

35. (New) An optical component as claimed in claim 8 wherein said generating curve follows a 5^{th} or a 7^{th} order polynomial path.

36. (New) A method as claimed in claim 28 wherein said generating curve follows a 5^{th} or a 7^{th} order polynomial path.